

THE APPLICABILITY OF MENTAL TESTS TO PERSONS OVER FIFTY YEARS OF AGE

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In psychological examinations made at the Psychopathic Hospital it has for some time seemed evident to the examiners that the majority of patients over 50 years of age do especially poorly in the tests of memory and in certain allied tests. Casual observation and another study² showed further that this deficiency depends relatively little upon type of mental disease and relatively much upon chronological age. The present paper is an account of our attempt to find reasons and numerical expression for the differences among our patients. We have attempted also to check our results by studying the influence of chronological age in the case of normal persons.

Cases Used and Their Comparability

The following groups of cases have been studied. No foreign-speaking adults and no children of foreign-speaking parents are included in any group.

(a) 106 older³ patients in a large general hospital in Boston (not an insane hospital).

76 per cent of this group are men So far as our problem

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² To be published shortly by J. C. Foster under the title "Significant Responses in Certain Memory Tests."

³ Older, in this paper is taken to mean 50 or more years of age. Younger is to be understood similarly as less than 50 years of age.

is concerned, however, a study of the cases reveals no significant influence of sex upon results.

This hospital charges up to \$10 a week where payment is exacted, but admits patients free when their families are unable to pay for treatment. 59 per cent were manual laborers. The average social status of the patients of this group is, therefore, relatively low. 32 per cent of them, for instance, left school before the 5th grade, and 85 per cent of them before the 9th grade.

All of these patients were given the Yerkes-Bridges Point Scale by the second writer. Our original plan was to include also several additional memory tests, but they had to be abandoned. In the first place, many of the patients had too poor eyesight to be given any "visual verbal" tests. But more than this, many of the older persons objected to attempting any memory test. At the mere hearing of the directions "when I am through reading I want you to tell me as much as you can of what I read" many of this group made such remarks as "Oh, no! I couldn't do that" or "Oh, no! my memory is too poor for that" or "That is child's play, don't try anything like that on me." The true reasons for refusal evidently were the conviction that their memory was poor and a reluctance to display this weakness. In general we found in working with normal older persons a similar reluctance to undertake other "difficult" tests. Some half dozen cases, for example, had to be discarded because the patient refused to attempt any test after the twelfth, that is to say, when the thirteenth was given, they would not attempt it, nor would they attempt any succeeding test. We were therefore forced to be content with giving the Point Scale alone.

(b) 315 normal young men between ages 20 and 30. This group is distinctly inferior in social status and education to the above group 79 per cent were manual laborers. 65 per cent of them left school before reaching the 5th grade, and 96 per cent left before reaching the 9th grade. All of these cases were given the Point Scale (omitting tests 14 and 18) by other examiners, but all scoring was checked by us. Tests 14 and 18 were omitted because the majority of the group had too little schooling to be able to do any of the tests involving sentence construction

(c) 316 normal school children between ages 10 and 19. These cases were from the Cambridge public schools and were tested in obtaining the original norms for the Point Scale.⁴ Their average social status is at least as high as that of group (a).

(d) 136 older persons, patients diagnosed psychotic either at the Psychopathic Hospital or at the Foxboro State Hospital. Their social status is comparable with the patients of group (a). It is possibly slightly superior. 60 per cent of the group are men. 27 per cent only were manual laborers. 32 per cent left school before reaching the 5th grade and 75 per cent before reaching the 9th. All were given the Point Scale by examiners of the Psychopathic Hospital.

(e) 151 younger persons, patients diagnosed psychotic at the Psychopathic Hospital. 52 per cent of the group are men. 22 per cent only were manual laborers. 17 per cent left school before reaching the 5th grade and 74 per cent left before reaching the 9th. There is no reason to suppose that the social status of this group is different from that of the above group (d). All were given the Point Scale by examiners at the Psychopathic Hospital.

Comparison of Older Psychotic and Younger Psychotic Persons (Groups d and e)

If we temporarily disregard type of mental disease, we find that the younger group attains on the average a higher score on each test as well as a higher total score. The superiority of the younger patients is, to be sure, most marked in tests 13 (words in three minutes), 14 (three words in one sentence), 16 (drawings from memory), and 18 (dissected sentences), but we cannot be sure how much the results are affected by type of disease and by total score (or mental age).

If, in an attempt to eliminate the influence of total score, we fractionate our cases by total score groups, we find two such score-groups sufficiently large for use,—53 to 60 (mental age 10) and 72 to 79 (mental age 13). The data for these groups are given in Table 1.

⁴ See Yerkes, Bridges, and Hardwick, *A Point Scale for Measuring Mental Ability*, 1915, Chap 4.

TABLE 1

AVERAGE SCORES OF OLDER AND YOUNGER PSYCHOTIC PERSONS

Test	Total Score		53-60		72-79	
	Age Groups		Older	Younger	Older	Younger
	Number of Cases		15	18	7	21
1		3.0	3.0	3.0	3.0	3.0
2		3.1	3.2	3.7	4.0	4.0
3		3.0	2.9	2.8	3.0	3.0
4		3.2	3.2	4.1	4.0	4.0
5		2.8	3.9	4.0	3.9	3.9
6		3.4	2.3	4.2	3.2	3.2
7		6.6	8.0	8.5	8.6	8.6
8		.8	1.1	1.5	1.9	1.9
9		3.8	4.0	5.0	5.3	5.3
10		4.2	4.5	6.4	6.1	6.1
11		1.8	2.4	2.7	2.0	2.0
12		3.1	3.6	4.0	3.8	3.8
13		1.4	1.3	2.2	2.6	2.6
14		.8	.9	2.2	3.1	3.1
15		5.5	4.3	7.1	7.0	7.0
16		.1	.7	.7	1.7	1.7
17		2.2	1.4	3.2	3.9	3.9
18		.2	1.3	3.1	4.1	4.1
19		3.2	2.0	5.1	4.1	4.1
20		1.4	2.1	2.8	2.7	2.7

From the results given in Table 1, we see that the seven tests in which there is a decided difference in score obtained by the two age-groups (older and younger) are 6, 8, 14, 15, 16, 18, and 19. The younger attain in test 16 (drawings from memory) 343 per cent of the score of the older, in test 18 (dissected sentences) 164 per cent, in test 8 (arrangement of weights) 130 per cent, and in test 14 (three words in one sentence), 133 per cent. In test 6 (repetition of sentences), on the contrary, the corresponding figure is but 72 per cent, in test 15 (comprehension of questions) 90 per cent, and in test 19 (definition of abstract terms) 74 per cent. These percentages must not be taken to mean too much because thus far we have paid no attention to character of disease but have grouped all psychotic cases together indiscriminately. We have, of course, an entirely different proportion of some mental diseases, such as senile dementia and arteriosclerosis, in the two groups. The effect of this factor, therefore, may be cutting across the effect of chronological age.

The effect of type of disease can be eliminated only by

considering each disease separately. Unfortunately we have only one diagnosis where our cases are sufficiently numerous to warrant such comparison. That disease is dementia praecox. We tried many groupings of total score and of chronological age in these cases and arrived finally at seven sub-groups each of which had the same range of total score but different chronological ages and each of which contained at least 10 cases under each age-group. The number of cases in some of these age-groups was as great as 52. The sub-groups are: Score 46-71, age 10-19 and 20-29; Score 46-71, age 10-29 and 30-49; Score 46-71, age 10-39 and 40-69; Score 72-85, age 10-29 and 30-49; Score 72-100, age 20-29 and 30-39; Score 72-100, age 10-29 and 30-49; and Score 72-100, age 10-39 and 40-69. Score 18-71 gives several groups but is too great a range for reliable comparisons. The comparison of the first twelve tests in the scale reveals nothing decisive, for now a younger, and now an older, group appears to be slightly superior. When, however, we come to the thirteenth test (words in three minutes) we find that in 5 of the 7 sub-groups the younger are uniformly better. The younger ages with entire uniformity give higher scores in tests 14 (three words in one sentence), 16 (drawings from memory), and in 18 (dissected sentences). Their score is greatest in the 16th test (about 200 per cent of the score of the older persons). The older ages, on the other hand, are superior in tests 15 (comprehension of questions), 17 (detection of absurdities) and 19 (definition of abstract terms). Their best performance is in test 17 (about 125 per cent). We have not given the complete data in these cases because it does not seem worth while in view of the relatively small number of cases in the groups and in view of the fact that with dementia praecox we may not be dealing with a unity after all.

The general result is that judging from our psychotic cases alone and given equal general intelligence, patients over 50 years of age excel those under 50 in comprehension of questions, detection of absurdities, and definition of abstract terms; while they are inferior to the younger patients in construction of sentences and drawings from memory.

*Comparison of Older Psychotic and Older Normal Persons
(Groups a and d)*

In the preceding section we have been careful to insist that we have been dealing with results on psychotic patients and that it may not be justifiable to infer from them to normals. The reader may also be tempted to argue that the changes

in score which appear with advancing chronological age may be due, not to the influence of age itself, but to the influence of the length of time which a patient has suffered from mental disease. That is to say, it is to be expected that deterioration will continue with the progress of a mental disease. We may have been measuring simply the influence of the course of the disease. If so, the psychotic older persons should differ markedly from normal persons of the same age. The next step, therefore, will be to compare older psychotic persons with their normal contemporaries.

Our groups of psychotic and normal older persons (groups *a* and *d*) are of approximately the same social level, with the former holding the possible advantage. In other regards the two groups are also very similar.

If we consider the groups as a whole and disregard both total score and type of disease, we find that the normal old have a higher average total score than the psychotic old, and that in most cases they have a higher average score on each of the tests. The exceptions are test 13 (words in three minutes) where the averages are the same, and test 14 (three words in one sentence) where the older psychotic patients surpass the older normal persons by one tenth of a point. This result in part answers the question we raised above in regard to the deterioration of the older psychotic persons. The older psychotic persons do show a lower intelligence rating than their normal contemporaries. Since they also have, if anything, a higher social rating, we must conclude that this greater deterioration is due to the progress of mental disease. A question remains, however. Is their greater deterioration a quantitative difference simply, or have the psychotic persons fallen off in certain abilities while retaining others to a normal degree? And further, are our results true for all diseases or merely for their average?

The last question may be answered first and most easily. Our cases include dementia praecox, unclassified paranoid psychosis, syphilitic psychoses, acute alcoholic and deteriorating alcoholic psychoses, manic-depressive insanity and senile dementia. If we consider these diseases separately and compare the results for one with the average attainments of normal older persons, we find that the dementia praecox, senile dementia, and arterio-sclerotic persons differ most from normal persons of their age, while manic-depressive and unclassified paranoid cases differ least. There is no disease, however, which gives results contradictory to our earlier figures for the two groups as wholes.

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We come now to the question of the particular tests in which these changes are most marked. To reduce the effect of total score, we must once more fractionate our cases accordingly. We then find two groups with sizes sufficiently great for reliable comparison: those with total scores between 53 and 60, and those with total scores between 76 and 79. From the results thus arranged it appears that the low rating of the psychotic cases in some of the tests, at any rate (such as words in three minutes, three words in one sentence, and drawings from memory) is not due to the fact that the patients are psychotic, for normal persons of the same general age, and of the same mental rating, do *even more poorly in these particular tests than do psychotic persons*

If, then, the particular failures are due not to the disease but to chronological age, we should get the same general results from the consideration of normal cases.

*Comparison of Older Normal and Younger Normal Persons
(Groups a, b, and c)*

The results for our normal older persons are briefly summarized in Table 2.

TABLE 2
AVERAGE POINT SCALE SCORES OF OLDER NORMAL PERSONS

	Chronological Age			
	50-59	60-69	70-79	80-89
Number of Cases	55	34	13	4
Test	1	3.0	3.0	3.0
	2	3.8	3.7	3.0
	3	2.9	2.9	3.0
	4	3.8	3.3	3.5
	5	3.8	3.7	3.3
	6	4.1	3.9	3.0
	7	7.8	7.3	8.0
	8	1.8	1.8	2.0
	9	5.5	5.6	3.0
	10	5.9	5.6	4.0
	11	2.6	2.5	1.8
	12	3.7	3.1	3.3
	13	1.6	1.9	1.8
	14	1.3	1.0	.5
	15	6.7	5.8	4.8
	16	9	.3	0
	17	3.4	2.9	2.3
	18	2.6	2.3	.5
	19	4.4	3.5	1.5
	20	2.3	2.2	1.0
Total Score	71.9	66.3	59.8	53.3

From this table we see that in general the total score falls off with advancing chronological age among normal persons. Of greater importance than the decrease itself, however, is the *manner* of the falling off, that is to say, the particular tests in which lowering of score first appears or in which it appears in greatest degree. In the table, the small number of cases in the highest age-group makes their average scores unreliable. We shall, therefore, confine ourselves to the three younger age-groups. In these three groups it is evident that with

TABLE 3
AVERAGE POINT-SCALE SCORES FOR NORMAL SUBJECTS OF THREE AGE GROUPS

Total Score	Chron. Age	Test									
		1	2	3	4	5	6	7	8	9	10
46-52	10-19 (c)	3.0	3.7	2.3	3.4	3.5	?	6.2	.9	4.1	4.6
	20-29 (b)	2.8	3.4	2.9	2.5	3.0	2.4	5.8	1.6	4.7	4.6
	50-84 (a)	2.8	3.6	3.0	3.8	3.2	2.4	6.2	2.0	4.8	5.0
53-60	10-19	3.0	3.7	2.8	3.7	3.8	?	8.2	1.5	4.8	4.8
	20-29	3.0	3.6	2.9	2.9	3.8	2.7	6.5	1.5	5.1	5.0
	50-84	3.0	3.4	2.8	3.3	3.7	3.8	6.6	1.7	4.7	5.1
61-66	10-19	3.0	4.0	3.0	3.9	4.0	?	6.6	1.8	5.1	5.6
	20-29	3.0	3.8	3.0	3.3	3.9	2.9	6.8	1.9	5.4	5.5
	50-84	3.0	3.6	2.8	3.1	3.7	2.8	7.5	1.7	5.2	5.5
67-71	10-19	3.0	4.0	3.0	3.9	4.0	?	6.9	1.6	5.5	5.9
	20-29	3.0	3.7	3.0	3.9	3.9	3.6	6.9	1.9	5.2	5.3
	50-84	3.0	3.7	2.9	3.4	4.0	4.9	7.6	1.7	5.6	5.0
72-75	10-19	3.0	4.0	3.0	3.9	4.0	?	7.2	1.8	5.7	6.2
	20-29	3.0	3.9	3.0	4.2	3.9	4.1	7.1	1.9	5.7	6.2
	50-84	3.0	3.6	3.0	3.8	4.0	5.0	7.5	1.5	5.9	5.6
76-79	10-19	3.0	4.0	3.0	3.9	4.0	?	7.4	1.7	5.8	5.6
	20-29	3.0	3.9	3.0	3.0	3.9	4.5	7.4	2.0	5.6	6.1
	50-84	3.0	3.8	3.0	3.6	4.0	5.6	8.2	2.0	5.4	5.2
80-82	10-19	3.0	4.0	3.0	4.3	4.0	?	7.3	1.9	5.9	6.3
	20-29	3.0	4.0	3.0	4.3	4.0	4.1	7.8	2.0	5.8	6.5
	50-84	3.0	3.8	2.9	3.8	4.0	4.8	8.5	1.5	5.8	6.3
83-100	10-19	3.0	4.0	3.0	4.6	4.0	?	7.9	1.8	5.8	6.9
	20-29	3.0	3.9	3.0	4.7	4.0	4.9	8.0	1.9	5.4	6.8
	50-84	3.0	4.0	3.0	4.3	4.0	4.5	8.1	2.0	6.0	7.1
AVERAGE FOR THE ABOVE EIGHT GROUPS											
46-100	10-19	3.0	3.9	2.9	4.0	3.9	?	7.2	1.6	5.3	5.8
	20-29	3.0	3.8	3.0	3.6	3.8	3.7	7.0	1.8	5.4	5.8
	50-84	3.0	3.7	2.9	3.6	3.8	4.2	7.5	1.8	5.4	5.6

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advancing chronological age there is a tendency for the scores in each test to fall off. This tendency is most marked in tests 16 (drawings from memory), 18 (dissected sentences), 14 (three words in one sentence), and 13 (words in three minutes). It is least marked; on the other hand, in the very easy tests (1, 2, 3, and 5, aesthetic comparison, missing parts, comparison of lines and weights, and counting backwards) and in test 17 (absurdities).

When we had reached this point in our investigation, we

TABLE 3 (continued)

AVERAGE POINT-SCALE SCORES FOR NORMAL SUBJECTS OF THREE AGE GROUPS

Test										No. of Cases
11	12	13	14	15	16	17	18	19	20	
1.6	2.3	1.7	1.2	2.6	1.0	.9	.1	.2	.9	45
1.8	3.4	.9	?	4.4	1.0	1.6	?	.9	1.1	40
2.6	2.8	.4	.0	3.4	.0	.0	.0	2.4	.2	5
1.8	2.9	2.0	1.9	3.2	1.2	1.5	1.4	.7	1.2	61
1.9	3.1	2.2	?	4.8	1.2	2.0	?	1.9	1.0	64
2.4	3.4	.7	.0	4.4	.0	1.9	.1	2.9	.8	9
2.2	3.2	2.6	2.7	3.8	1.7	1.7	1.9	1.5	1.6	39
2.5	3.3	1.7	?	5.2	1.5	2.0	?	2.3	1.1	60
2.8	3.6	.8	1.1	5.1	.2	2.3	1.3	3.5	1.2	13
2.3	3.4	2.8	2.8	4.5	2.1	2.1	2.6	2.3	2.3	31
2.4	3.5	1.9	?	5.7	2.3	2.7	?	3.1	1.5	42
2.6	3.6	2.0	.7	6.0	.7	3.6	1.3	2.3	2.0	7
2.6	3.5	2.6	3.6	5.1	1.7	3.6	3.2	3.0	2.4	21
2.6	3.7	2.2	?	6.1	1.6	3.2	?	3.0	1.8	27
2.6	3.9	2.3	1.2	6.6	.3	3.5	2.0	3.0	2.5	8
2.5	3.7	3.3	3.6	5.3	2.5	3.2	3.5	3.3	2.8	31
2.0	3.5	2.4	?	7.1	1.8	3.6	?	4.1	2.1	34
3.0	4.0	1.6	1.5	6.8	.6	4.4	4.0	4.4	1.8	5
2.5	3.6	3.4	3.8	7.1	2.3	3.9	3.8	3.5	3.2	19
2.3	3.9	2.8	?	6.6	2.5	4.0	?	4.1	2.6	26
2.5	3.7	1.9	2.7	7.8	.3	4.3	3.1	4.8	2.8	13
2.6	3.9	3.8	3.8	7.0	3.2	4.0	5.1	4.8	3.9	69
2.7	3.9	3.1	?	6.9	3.2	4.4	?	4.6	3.9	22
2.8	3.7	2.5	2.8	7.9	2.1	4.8	4.9	5.8	4.6	17
AVERAGE FOR THE ABOVE EIGHT GROUPS										
2.3	3.3	2.8	2.9	4.8	2.0	2.6	2.7	2.4	2.3	316
2.3	3.5	2.2	?	5.9	1.9	2.9	?	3.0	1.9	315
2.7	3.6	1.5	1.3	5.8	.5	3.1	2.1	3.6	2.0	77

realized that to make the study complete we needed records of normal persons under 50 years of age of the same general class as our group of older normal persons. It is regrettable that we had not time to continue our work at the General Hospital in which we obtained our older normal cases. We were obliged to use records obtained by other experimenters from other sources. The only records of persons between 30 and 50 years of age which we could easily consult were those of persons so superior intellectually to the cases above considered that they were incomparable. There is, therefore, a gap at ages 30-50 in our Table (3) which summarizes the results of all our normal subjects, including school-children, young men and older persons.

No grade could be given to the school-children in test 6 because the form of this test has been changed since they took the examination. Neither could any grade be given to the young men in tests 14 and 18 because so many of this group were illiterate that these tests were omitted. For this group (*d*), therefore, the groups of total scores in the left hand column should read 46-50; 51-56; 57-61; 62-65; 66-68; 69-71; 72-74; and 75-90. In the last section of the table we have given the averages of the eight total-score groups. This, to be sure, is an "average of averages." Even so, however, it is more significant than would be an average of the original scores. In the first place, we could not use the simple average of scores obtained on each test by each of our age-groups because there were so many more high scores among the younger that they would have appeared to too great an advantage. We, therefore, divided our cases in groups by total score attained. The averages for these groups may then be treated as if they had been "corrected" and as if there were an equal number in each total score group, and our "average of averages" is, then, the average score attained on each test by each age-group, supposing the distribution of total scores for the age-groups to be the same.

From Table 3 it appears that tests 1 (aesthetic comparison), 3 (comparison of lines and weights), 5 (counting backwards), 7 (description of pictures), 9 (comparison of terms), and 20 (analogies) show little or no regular change with advancing chronological age. Tests 2 (missing parts), 4 (memory span for digits), 6 (memory span for sentences), and 10 (definition of concrete terms) show a slight tendency toward decrease with advancing age. Tests 8 (comparison of weights), 11 (line suggestion) and 12 (copying square and diamond) show a slight tendency for the score to increase

with advancing years. The other tests show decided tendencies. Tests 13 (words in three minutes), 14 (three words in one sentence), 16 (drawings from memory), and 18 (dissected sentences), all show a marked falling-off in score as the chronological age increases. This is most marked in test 16 (drawings from memory). On the other hand, the remaining tests, 15 (comprehension of questions), 17 (absurdities), and 19 (definition of abstract terms), show an increase in score with increased age. From the results we may conclude that the improvement in the ability to comprehend questions comes fairly early, since our young men are so far superior to the school children and are practically the same as the older persons. The improvement in absurdities and definitions of abstract terms, on the other hand, seems fairly regular. The falling-off in giving words in three minutes seems regular, but in drawings from memory, the score does not show any decided decrease until late, that is, the young men differ but little from the school children, while the older persons are decidedly inferior to the young men. Here again we regret that the lack of sufficient data on persons between 30 and 50 prevents us from more than guessing at the points at which the various abilities show changes.

The main conclusion to be drawn from our work thus far is that whether we study psychotic or normal persons with approximately the same total score, the younger persons tend to excel the older in giving words in three minutes, in building sentences and in drawing from memory; while the older excel the younger in comprehending questions, in detecting absurdities, and in defining abstract terms. Our results were so consistent throughout that we next turned to the literature to see if experimenters who were looking for something else had results which agreed at all with ours.

Results from Previously Published Work

In our paper on "Significant Responses in Certain Memory Tests," (referred to in footnote 2), in which we consider only Psychopathic Hospital cases, some of whom were diagnosed as "not insane," we find no uniform changes with increasing chronological age in the score of memory span for digits. We do find, however, a decided tendency for the score of drawings from memory thus to decrease. The point at which this decrease begins differed for the different mental diseases, but in all it begins before age 50. A similar decrease is found in the scores of memory for short paragraphs.

Our results in general are also confirmed by a study of the

contributions of two other writers. Both of these are reports of Binet examinations (one, the Goddard, 1911, and the other, the Stanford revision). The differences in grading and in the tests themselves make a rough comparison the only one possible.

An article by Wender⁵ gives much valuable material, though his conclusion on the basis of his selected cases that his data furnish proof for the necessity of a revision of the scale appears unjustified. His Table II shows the tests passed by 30 cases of senile dementia or arterio-sclerosis, with an average chronological age of 74 and an average mental age of 9.4. From it we have calculated the percentage of the cases which passed each test which corresponds to a test on the Point Scale. The results of such calculation are given in Table 4.

TABLE 4
PERCENTAGE OF WENDER'S CASES PASSING TESTS SIMILAR TO POINT SCALE TESTS

Binet 1911 Test	Corresponding Point Scale Test	Percentage Passing
VI, 5	1	87
VII, 3	2	37
VIII, 5; X, 3; XII, 1	4	65
VIII, 2	5	67
VII, 2; XV, 1	7	67
IX, 5	8	13
VIII, 1	9	83
VI, 2; IX, 2	10	70
XII, 4	11	17
VII, 4	12	67
XI, 3	13	23
X, 5; XI, 2	14	27
X, 4	15	57
X, 2	16	7
XI, 1	17	33
XI, 5	18	27
XII, 2	19	83

The most striking points about Table 4 are that test 19 (a 12-year Binet test) should have been passed by 83 per cent of a group whose average mental age was only 9.4 and that test 16 (a 10-year test) should have been passed by only 7 per cent of the same group. Tests 2 and 8 (missing parts and arrangement of weights) also give a low average when

⁵ "The Applicability of Binet-Simon Tests in Psychoses of the Senium." *N. Y. Medical Journal*, March 6, 1915.

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we consider the age level to which they presumably belong. Test 8 was one of the tests in which our younger psychotic patients were superior to the older psychotic patients. Test 2 was found to change very little until we reached the 80-89 group of our normal older persons. But, other than this, our results do not seem to uphold Wender's findings for tests 2 and 8. The successes in Wender's group are more striking than the failures. We have already mentioned the remarkable performance in test 19 (definition of abstract terms). Tests 15 and 17 (comprehension of questions and absurdities) also give very high percentages. Test 15, a 10-year test, is passed by 57 per cent of the cases; and test 17, an 11-year test, by 33 per cent. These three tests, it will be remembered, were the three which we found to be particularly easy for the older persons, and we may say, therefore, that Wender's work supports our results in so far as the two have anything in common.

The second contribution mentioned is in Terman's statistical account of the bases of the Stanford revision.⁶ From this account we have taken the results on Knollin's unemployed men (hoboes), chronological ages 21-60, but chiefly 25-40, mental ages 10-18. The results are summarized in Table 5.

TABLE 5

PERCENTAGE OF KNOLLIN'S CASES PASSING TESTS AT DIFFERENT MENTAL AGES

Stanford Revision Test	Percentage Passing at Mental Ages								Corresponding Point Scale Test
	10	11	12	13	14	15	16	18	
IX, 2		70	79						8
X, 6		40	60	56	60				13
IX, 5	30	67	75	96					14
X, 5	70	85	98	100	100				15
X, 3	41	52	67	70	73				16
X, 2	50	60	82	81					17
XII, 4		0	27	54	63				18
XII, 2		50	90	83	97				19

The blank spaces in Table 5 seem to mean that if the table were completed, there would be zeros in the blanks to the left of the figures given and hundreds to the right. It is, of course, impossible to determine what these subjects might have

⁶ Terman and others, *The Stanford Revision and Extension of the Binet Simon Scale for Measuring Intelligence*, 1917, p 163 ff.

done on the other comparable tests of the Point Scale because the arrangement of the Stanford is such that they were not given.⁷ Test 18 (dissected sentences) is very difficult for the Knollin group. Although it is a 12-year test, only 27 per cent pass at age, and only 63 per cent of cases with a mental age of 14 pass. Likewise test 16 (drawings from memory) is difficult, for although a 10-year test, only 41 per cent of those with mental age 10 pass it, and only 73 per cent of mental age 14 pass. Test 14, again (three words in one sentence), is done but poorly. On the other hand, test 15 (comprehension of questions), gives percentages which are normal for its place in the scale and test 17 (absurdities) is not far behind. Test 19 (definition of abstract terms) is evidently done better than we should expect from school children. We have, then, roughly, though not as decidedly as for Wender's older cases, the conclusion that tests 14, 16, 18, and probably 13 (three words in one sentence, drawings from memory, dissected sentences, and words in three minutes) are difficult for hoboos of chronological ages between 25 and 40, and that test 19 (definition of abstract terms) is easy for them. Furthermore, if we compare these cases with those for Williams' juvenile delinquents,⁸ ages mostly 14 to 21, we find that the hoboos do much better than the delinquents in test 19 (definition of abstract terms), and that the delinquents far excel the hoboos in tests 13, 16, and 18 (words in three minutes, drawings from memory, and dissected sentences). The same tendency holds true if we compare them with still younger cases. The only comparison possible between the business men and the High School pupils⁹ is on tests 18 and 19 (dissected sentences and definition of abstract terms). Test 19 is passed by 1 per cent more pupils than business men, but in test 18 this percentage rises to 10, showing that test 18, at least, is harder for business men. That is to say, the falling off in ability to put together dissected sentences has begun already in middle aged business men. In the comparison of abstract terms (a Stanford test which is similar to the Point Scale definition of abstract terms) 13 per cent more business men pass than do pupils. We find again then that younger

⁷The above seems to the writers a strong argument for the use of scales of the type of the Point Scale in all cases where there is a probability of wide "scatter." In year scales there is far greater chance of passing over some defect or peculiarity simply because it is not expected at the chronological or mental age of the subject

⁸Terman and others, *op. cit.*, p 170 ff

⁹*op. cit.* p 171 ff

persons consistently excel older in certain tests and are inferior to them in others

The results of other investigators, therefore, although obtained for quite different purposes, agree almost absolutely with our findings as to the influence of chronological age.

Probable Reasons for the Differences Between Older and Younger Persons

The above data show with reasonable certainty that there are decided changes in the distribution of abilities (as shown by the Point Scale) as persons get older. These changes appear whether we compare the insane or the normal, whether we lump all our cases together or fractionate them by particular disease, whether we compare the very old with the very young, or whether we compare the middle-aged with young adults. The only condition which must be observed is this one: that only those whose total score, or general level of intelligence, is approximately the same may be reliably compared. If we do not make this restriction, the young will be found to excel in each test as well as in the total score.

The next question is: Why do we find this change in ability as persons get older? It is evident, of course, that as a person grows older he loses some of the abilities he had as a child or young adult. We are all familiar with aged persons who fail to remember what happened yesterday, but who expect their grandchildren to recall, as they themselves do, events which happened many years ago. We say commonly that old people have poor recent, but good remote memory, but we seldom inquire into their abilities outside the field of memory.

In the present paper we have tried to determine more exactly the abilities and disabilities of the old and to estimate roughly, at least, the age at which changes are most marked. It is to be supposed that a defect in memory which is clearly present in a person of 80 must have been coming on for some time.

We have found that in the abilities which are tested in the Point Scale the old persons have deteriorated much more in some than in others. The reasons for the individual losses we conceive to be three. In the first place, there is some actual loss in ability. This is shown particularly in the drawings from memory. From our practical acquaintance with aged persons we are forced to conclude that they are actually unable to recall certain recent impressions. In the second

place, there is a lack of practice in certain kinds of performance. Such, for example, we take to be the case in the construction of sentences. There seems to be a possibility that, given sufficient incentive and sufficient practice in this test, an older person may equal the performance of his juniors. The difficulty is that the common incentives such as praise, approval, etc., which are so effective with children, are of little avail with the old. We come now upon the third point which is probably the key of the whole problem. The younger subjects are almost invariably more alert and interested. Their experience is such that they fit more naturally into the test situation. They appear more adaptable than the older ones. Moreover, the tests in which they excel are those which most resemble "stunts" or "puzzles" and which, therefore, require not only willingness, but also a rapid adjustment of the subject. If we consider the tests in which the older subjects are superior we find them to be the ones which are more like the problems which arise in the daily life of adults and which could be answered best by persons who had had the accumulated experience of years.

There seems, therefore, to be such a decided break between the older and the younger persons that it is not fair by the former to grade them by an examination intended primarily for adolescents. The whole question of the applicability or fairness of any such examination to older subjects therefore depends on the purpose for which it is given.

The purposes of examinations of persons over 50 seem to us to be two: first, the determination of the degree of deterioration or aberration present; second, the determination of the presence of feeble-mindedness. In both cases there are two possible standards of comparison, namely their supposed former ability (or that of average normal young person) and the average ability of their contemporaries. It is without doubt interesting to note that a person who once had a mental age of 18 has now one of only 10. It is, however, of much greater importance to know whether the average person of the same present chronological age and of the same former mental age has deteriorated to the same degree. If the patient's deterioration is the same in amount and kind as that of his normal contemporary, then we cannot lay that deterioration to the presence of mental disease or to initial feeble-mindedness. Moreover, if the history of an old person convinces us that he has always been of a low grade mentally it is often desirable to know the maximum mental age which the patient ever attained. Our best guess here would be based

on those tests in which the normal contemporary has not shown deterioration.

In most work with psychological examinations we have the constant difficulty that many non-psychological persons (and, alas! some psychologists) take our results as too simple. They read the mental age, without taking any notice of the comments of the examiner. If the mental age is less than 12 they glibly diagnose the patient feeble-minded. In order to circumvent such hasty diagnosticians and in order to give a mental age which shall more exactly express the ability of the subject before the influences of old age became marked, we have calculated some allowances which should be made in the case of persons over 50 years of age.

Suggested Score Corrections for Old Age

Already at this hospital we had been in the habit of making allowance for the omission of certain tests and we now applied the same method to a scheme for discounting the effect of advancing years. Perhaps it will be as well to give the history of the previous work, so that the present calculations will not seem too fanciful. To be sure, the plan we are about to present has obvious faults and we can claim for it no more than fairly satisfactory results. We give it here in the hope that the idea will lead some others to similar work and will in the end result in an accurate and theoretically correct table.

The first problem of the kind which arose was the question of how to grade patients who were totally deaf and who, therefore, could not be given tests 4 and 6 (auditory memory span for digits and sentences). Our procedure at first was to add the scores with these tests omitted, call that the minimum mental age, then add to that the highest score obtainable on the two omitted tests, call that the maximum mental age, and then say that the true mental age lay somewhere between those two limits. This was fairly satisfactory, but we thought it possible to get a more accurate statement. This we computed from our table of scores for each test which were to be expected for different ranges of total score¹⁰. From the table we calculated the amount of credit to be expected on tests 4 and 6 for each of the ranges of total score. We then constructed a table giving the amount that should be added for each total score obtained when the two tests were omitted.

¹⁰ This table was published with some printer's errors, (later corrected) in the *Journal of Abnormal Psychology*, XIII, 1918, p. 77.

We later made similar tables of corrections for omission of tests 14 and 18 (lack of education) and for tests 1, 2, 3(a), 7, 11, 12, 16, and 18 (total blindness). The corrections for lack of education were adopted by the Division of Psychology in the Surgeon General's Office for use in the examination of illiterates. The corrections are given in Table 6.

TABLE 6
CORRECTIONS FOR POINT SCALE NORMS WHEN CERTAIN TESTS ARE OMITTED

When 4 and 6 are Omitted (Deafness)		When 14 and 18 are Omitted (Education)		When 1, 2, 3 (a), 7, 11, 12, 16, and 18 are Omitted (Total Blindness)	
For Scores:	Add.	For Scores:	Add.	For Scores.	Add:
13-25	5	18-51	0	7-13	..11
26-60	6	52-58	2	14-15	15
61-78	7	59-62	4	16-21	16
79	8	63-69	6	22-28	17
80-91	.9	70-74	8	29-34	18
		75-77	9	35-39	21
		78-90	10	40-42	.. 24
				43-48	27
				49-50	29
				51-52	30
				53	32
				54	33
				55-66.	34

With these tables as models, we proceeded to make a similar table to correct for advanced chronological age. We have found throughout, as we have said, that the older subjects are almost without exception poorer in tests 13, 14, 16, and 18 than younger persons attaining the same total score. We have therefore supposed that these tests should be omitted in giving the examination to old people and have calculated the corrections for such omission. We do not mean that the tests should actually be omitted. On the contrary, if a person of over 50 years of age obtains a high score on the four tests, it is evident that he has not begun to lose certain abilities which many of his contemporaries have lost. In other words, in our opinion failure on tests 13, 14, 16, and 18 on the Point Scale means little or nothing if the subject is advanced in years, while success on those tests may be very significant. The corrections which we offer tentatively for this group of advanced ages are given in Table 7.

TABLE 7

CORRECTIONS FOR POINT SCALE NORMS TO BE USED WITH OLDER SUBJECTS

When Tests 13, 14, 16 and 18 are
Omitted
(Advanced Chronological Age)

For Scores	Add.
18-36	0
37-43	1
44-48	3
49-53	5
54-55	9
56-58	12
59-61	13
62-66	15
67-69	17
70-82	18

At first thought it may appear that if we correct for failures which seem to be due to advanced age alone, we should also correct for successes which are apparently due to the same cause. Perhaps we should. If the idea were carried to its logical extreme we would be correcting for every test except 1 and 20, the only ones in which the average score for young and old is identical. Such a procedure would, of course, be meaningless, and would amount to giving a mental age on the basis of two tests alone. Somewhere, then, we must draw the line between no correction and total correction. We considered at first correcting for those tests in which one age gave an average score which was 120 per cent of the score obtained by the other age. This limit, however, would make us correct for 8 tests, in five of which the younger and in three of which the older were superior. Eight seemed such a large percentage of the total number (20) of tests that we were afraid we were again basing mental age on too few tests. If the limit were raised to 200 per cent, we would be correcting for only three tests, 13, 14, and 16. Test 18 which came next on the list with the younger excelling the older by 136 per cent, was later included because the test is one which many of the older subjects dislike, and which they often cannot see to read. The actual limit used was, therefore, 136 per cent.

Conclusions

1. There are certain definite changes in the distribution of scores on the Point Scale as the chronological age of the subject increases

2. These changes are evident in both normal and psychotic persons.

3. There are three probable reasons for the changes: loss of ability, lack of practice, and absence of alertness or of interest in the older subjects.

4. The mental condition of a subject over 50 years of age will be much more accurately presented if two mental ages are given: one which compares him with his own adolescent ability (or with that of normal young persons), and one which compares him with his normal contemporaries.

5. A mental age which compares a subject with his normal contemporaries may be calculated from our Table 7.